Book Reviews

A Somewhat Forgotten Physicist

Ferdinand Braun. A Life of the Nobel Prize-winner and Inventor of the Cathode-Ray Oscilloscope. FRIEDRICH KURYLO and CHARLES SUSSKIND. Translation and revision of the German edition (Munich, 1965). MIT Press, Cambridge, Mass., 1981. xviii, 290 pp., illus. $29.95.

Ferdinand Braun is not a very famous name in the annals of modern science, and in that fact itself is a story worth telling. Braun's accomplishments were certainly noteworthy, including as they did the discovery of the rectifier effect that is the basis of the "cat's whisker" diode; the formulation of the thermodynamic concept of free energy; the invention of the cathode-ray oscilloscope (as a result of which he is arguably one of the many fathers of television); and the creation of the indirectly coupled, tuned, directive system of wireless telegraphy. He was sufficiently recognized in his own day to share the Nobel Prize for Physics and to be offered such prestigious positions as the physics chairs at the universities of Leipzig and Berlin. The relative obscurity of Braun's name, even in his native Germany, thus presents a challenge, and the challenge is confronted head on by this first full-scale biography.

The rescue of reputations can be a tricky business, lending itself to hyperbole and over-enthusiastic efforts to compensate for past neglect. This biography largely avoids these pitfalls, for Friedrich Kurylo's 15-year-old work, hitherto available only in the original German, has found, in Charles Susskind, a translator and adaptor with perfect scholarly credentials for the task. The result is not only good biography but also a contribution to our understanding of the German scientific establishment in its heyday and of its enormously productive relationship with industry.

The physicist Braun was the product of the 19th century's most awesome academic apparatus, the German university system. Trained at the universities of Marburg and Berlin, he received his doctorate under Hermann von Helmholtz in 1872. The next decade he spent after the fashion of the typical young German scientist engaged in the slow progress through the academic ranks, until, in 1882, he was appointed to the physics chair at the Technical University of Karlsruhe. The chronicle of Braun's career provides a fascinating look at the combination of politics and persistence that was necessary for success in the German educational system.

Braun worked well and without controversy in that system, and this was a major reason he was offered in 1895 the politically sensitive chair at the German University of Strasbourg. It was here that Braun, working in the well-financed and well-attended Physics Institute of the university, made his best-known contributions, creating a school for studies in high-frequency physics as well as producing the cathode-ray oscilloscope and his important radio circuits.

The two decades of experimentation and innovation that followed Heinrich Hertz's 1888 demonstration of how radio waves could be generated and detected produced a tangle of technological and commercial efforts that have made it difficult to delineate clearly the origins of modern wireless communication. Recent scholarship has done much to give us a better grasp of what was going on in this lively and fruitful period, when men like Oliver Lodge, Guglielmo Marconi, and Alexander Popov were laying the technical foundations for a new industry. Though no worthwhile history of radio would totally neglect Ferdinand Braun's work, it is typically treated as being of secondary importance (Hugh G. J. Aitken's excellent *Syntony and Spark*, for example, devotes only a single paragraph to a description of Braun's circuits). This biography brings to the English-reading audience a fuller picture of the German contributions to practical radio technology. Braun was not the only worker in the field to recognize the utility of inductive coupling for improving the performance of wireless transmitters, but there is substantial reason for recognizing him as the one who, thoroughly grounded in the physics of high-frequency oscillators, made the clearest demonstration of the advantages of such coupling. The importance of this to radio technology was recognized in 1909 when the Nobel Prize for Physics was shared by Marconi and the much less famous Braun.

As depicted by Kurylo and Susskind, Braun's career illustrates not only the increasingly productive cooperation between university scientists and the technical and business communities for which Germany was already famous at the turn of the century but also the tensions that such cooperation could create. As other scientists discovered in the pioneering days of radio, the exigencies

12. Ueber ein Verfahren zur Demonstration und zum Studium des zeitlichen Verlaufes variabler Ströme; von Ferdinand Braun.

1. Die im Folgenden beschriebene Methode benutzt die Ablenkbarkeit der Kathodenstrahlen durch magnetische Kräfte. Diese Strahlen wurden in Röhren erzeugt, von deren einer ich die Maasse angebe, da mir diese die im allgemeinen günstigsten zu sein scheinen (Fig. 1). *K* ist die Kathode aus Aluminiumblech, *A* Anode, *C* ein Aluminiumdiaphragma; Oeffnung des Loches = 2 mm. *D* ein mit phosphorescirender Farbe überzogener Glimmerschirm. Die Glaswand *E* muss möglichst gleichmässig und ohne Knoten, der phosphorescirende Schirm

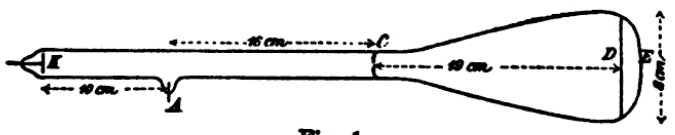

Fig. 1.

Title, descriptive paragraph, and drawing from Braun's paper describing the cathode-ray oscilloscope, published in *Annalen der Physik und Chemie* (series 3, vol. 60), 15 February 1897. [From *Ferdinand Braun*]

of commercial competition were often not compatible with the customary free and critical exchange of ideas crucial to academic science. It was with some relief, then, that Braun acceded to the merger of all German radio concerns in 1903, including his own, to form one of the giants of the world radio industry, Telefunken.

As deeply involved as he might be in scientific or technical matters, Braun maintained a careful equilibrium in his own life-style. He was notable as a teacher and a popularizer of science and was widely liked. It is particularly poignant, therefore, to read of the collapse of his life and career in the turmoil of the First World War. Not only did Strasbourg's proximity to the Front thoroughly disrupt university life, strategic concerns caused Braun to be sent in late 1914 to the United States to defend German radio interests. The war prevented his return home, and he died in April 1918, at age 67, in Brooklyn, New York.

The lonely circumstances of Braun's death brings us back to the question posed by the diminution of his reputation over the years. In a particularly thoughtful epilogue, the authors ponder the sources of scientific fame. Braun's death far from home brought little of the recognition that normally attends the passing of great scientists. The demise of the German university at Strasbourg left no institution to perpetuate his name. And the simple lack of a biographer for a half-century after his death left Braun without a champion in the lists of scholarship or journalism. This last problem, at least, now has been successfully remedied.

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